



WATER RESOURCES RESEARCH GRANT PROPOSAL

Title: Development of Efficient Planning and Management Models for the Apalachicola-Chattahoochee-Flint and Alabama-Coosa-Tallapoosa River Basins"

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Duration: From September 1, 1997 to August 31, 2000 (3-year project).

Fiscal Year 1997 Federal Funds:	\$30,070	\$30,070	\$0
(Sept. 1997 to August 1998)	(Total)	(Direct)	(Indirect)
Non-Federal Funds Allocated:	\$78,851	\$52,920	\$25,931
(Sept. 1997 to August 1998)	(Total)	(Direct)	(indirect)

Principal Investigator & University: Professor Aris P. Georgakakos, Georgia Tech, School of Civil Engineering, Atlanta, Georgia 30332

Congressional District: No. 5

Statement of Water Problem:

The proposed investigation aims at supporting the effort of the States of Georgia, Alabama, and Florida and the U.S. Army Corps of Engineers to develop sound and mutually agreed upon management strategies for the Apalachicola-Chattahoochee Flint (ACF) and Alabama-Coosa-Tallapoosa (ACT) River Basins.

Specifically, under the auspices of the ACF-ACT partners, two river basin simulation models have been developed to screen and assess the most plausible management options. These models are the STELLA H developed by High Performance Systems Inc. and HEC-5 developed by the U.S. Army Corps of Engineers. Separate tests of these models by the Georgia Environmental Protection Division and by *Georgakakos et al., 1997a*, revealed several water budget inconsistencies including sizable discrepancies in reservoir elevations, energy generation, and reservoir outflow. Though some of these discrepancies can be mitigated by using more consistent input data and modeling procedures, important concerns remain, undermining the value of these models as impact assessment tools.

There is a clear need to conduct further diagnostic testing and develop procedures to rectify model inconsistencies.

Statement of Results:

Grouped by year, the following project outputs are envisioned:

First Year

- Diagnostic testing of STELLA II, HEC-5, and the Georgia Tech (or) Reservoir Control Model for a subsystem of the ACF-ACT river basins, leading to detailed account of model capabilities and performance with a thorough assessment of inconsistencies and associated causes
- Development of procedures to rectify model inconsistencies. Specifically, one such enhancement will be to supply HEC-5 and STELLA II with an optimization routine which simulates generation efficiency credibly for the entire plant operation range, and represents accurately the relationship between plant outflow, energy or power generation, and reservoir elevation. This routine will also model pump-back operations at Carters.
- Development of procedures to address the modeling of dependable capacity and firm energy commitments consistently across various time scales. Specifically, such commitments apply to hourly (dependable capacity) or weekly basis (firm energy), and the challenge is to incorporate them in daily (HEC-5) or monthly (STELLA II) models.
- Testing of the various STELLA II and HEC-5 enhancements in the case study system, and development of performance measures and conditions of applicability.
- Comparative analysis of strengths and weaknesses of STELLA II, HEC-5, and optimization models.
- Training of engineering personnel from all Partner agencies in the theory, capabilities and limitations of all models and hands-on experience with their use.
- Technical report describing the theory of models and summarizing the findings of the investigation. User manuals for the GT Control model and the STELLA II and HEC-5 enhancement procedures. Training materials.

Second Year

- Reconditioning and testing of STELLA II and HEC-5 for the entire ACF-ACT system.
- Use of STELLA II and HEC-5 in impact assessment studies in cooperation with ACF-ACT Partner agencies.
- Development of various G_t Control Model components for the ACF-ACT system.
- Training of engineering personnel from all Partner agencies in the proper use of the models.